

AFFORDABLE SENSOR TECHNOLOGY

TITLE: ADVANCED ACOUSTIC SENSOR

OBJECTIVE: Develop acoustic sensor technology to detect, locate, measure features, and discriminate a given object when it comes within a certain distance and within a certain field of view of the acoustic sensor. With sensor netting and data fusion, detected information would be shared and updated in real time to conduct battlefield reconnaissance and security to improve force survivability. In addition, the military incorporates acoustic sensors into weapon platforms to cue the weapon when and where a target is detected and when it should fire. In the commercial sector, acoustic sensors offer many potential applications, which include facility surveillance and security, voice recognition, traffic management and control, noise cancellation and abatement, medical procedures, patient or child monitoring, and non-destructive inspection.

DESCRIPTION: Proposals should address the following areas for improving acoustic sensor performance.

- a. Noise self-cancellation – Microphones and accelerometers are used to establish reference environmental noise levels. Adaptive noise cancellation algorithms are used to remove the environmental (background) noise effects from primary sensing systems.
- b. Wind noise alleviation – Sensor position and airflow over sensor produce varying noise levels. Windscreen design and microphone distribution can optimize performance of sensor elements in presence of wind noise.
- c. Acoustic source classification – Analysis of distinguishing acoustic features (based on physical characteristics) in the detection signature, which facilitates the possible classification and identification of the source of the signal.
- d. Sensor fusion – The ability to analyze signals from various sensors (same type or different) in order to determine more accurate information about the signal source, its dynamics, and its location.
- e. Self mapping – Ability of acoustic detectors to locate their positions relative to each other by monitoring controlled, localized, impulsive acoustic signals (such as a 'pop' sound).
- f. Location via time difference of arrival – Analysis of acoustic signals which are detected at multiple sensor sites, at slightly different times, in order to extrapolate a location of the signal source.
- g. Environmental characterization and compensation – Ability to adjust detection and classification performance by 'tuning' algorithms to emulate environmental dependent propagation effects.
- h. Simulation & modeling – Computational techniques and capabilities (not specific to acoustics) which can be used to analyze atmospheric and terrain effects and predict their impact on acoustic detection performance.

ESTIMATED MAXIMUM FEDERAL FUNDING CONTRIBUTION: \$1M

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SUBMIT PROPOSALS TO:

U.S. Army TACOM-ARDEC

AMSTA-AR-PC-A, Bldg 10

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Picatinny Arsenal, NJ 07806-5000

TITLE: RADIO LOCATION SENSOR

OBJECTIVE: The focus of this effort is to develop a radio external sensing system for tanks to detect, identify and geo-locate tactical radio signals. Traditional intelligence and electronic warfare stand-off systems provide support to the Divisional assets. There is currently no mechanism to provide real-time information to the individual warfighter. This radio-location system would provide the individual warfighters with this information. The developed system would make use of existing radio's located in the tank. The existing radio would be modified to allow the tank commander to communicate while simultaneously looking through, detecting, intercepting, and identifying other signals. Intercepted signals would be processed to determine signal externals such as frequency, modulation scheme, hop-rate, etc. The waveform characteristics would be cross-referenced to an on-board signal library to determine if "friend or foe". An algorithm would choose the appropriate waveform to jam a desired signal. The waveform would then be generated on-board and radiated using the same radio's antenna. This radio/location sensor would be capable of being used with a combination others on different platforms to perform precision location of emitters. The existing SINCGARS radios would initially be modified to incorporate this technology. As technology matures, software programmable technology and Field Programmable Gate Array technology would be used.

This work would provide the tactical commander with wide-area, detecting and alerting capability through enemy radio emissions, and also provide "jam-on-the-move" capability. This would also provide the tactical commander with situational awareness of the RF environment as well as help reduce fratricide.

DESCRIPTION: Existing combat-net-radios (i.e.SINCGARS) would initially be modified to incorporate this technology. The existing radio would be modified to allow the tank commander to communicate while simultaneously looking through, detecting, intercepting, and identifying other signals. Intercepted signals would be processed to determine signal externals such as frequency, modulation scheme, hop-rate, etc. The waveform characteristics would be cross-referenced to an on-board signal library to determine if "friend or foe". This radio/location sensor would be capable of being used with a combination of other radio/location sensors on different platforms to perform precision location of emitters.

This technology will have widespread commercial applications for search and rescue missions. The technology can be used to geo-locate radios located on distressed boats, cars, and planes as well as individual 911 callers, and the people with medical pagers.

ESTIMATED MAXIMUM FEDERAL FUNDING CONTRIBUTION: \$400 K

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SUBMIT PROPOSALS TO:

U.S. Army Communications and Electronics Command
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TITLE: LOW COST MICROSENSORS AND APPLICATIONS

Objective: Develop low cost microsensors in the near and far infrared that are expendable, integrate into multiple attended and unattended applications, and develop commercial spin-off products that will enhance the production quantities to allow for low cost objectives. Miniature size, weight and power are also a top priority so that these sensors could be used in new applications where previous sensors failed to meet the micro sensor definition.

Description: Several applications are contemplated. One application is a helmet-integrated sensor (60 degree field of view or larger). A 1-2 micron (overcast starlight capability), and an 8-12 micron uncooled sensor will be mounted atop a military helmet. A head-mounted display will also be incorporated into the helmet and will display either a single band image or a fused image. The total weight of the sensor and display shall be less than one pound and the total power shall be less than two watts. A transmitter, micro laser rangefinder, battery, and a GPS receiver shall be belt mounted. The commercial counterpart of this is a firefighters helmet with an infrared sensor (8-12 micron) or a portable medical imaging device that could be used as a diagnostic adjunct or to enhance surgical vision. The firefighter version shall be designed to withstand temperatures as high as 400F. The commercial version shall cost less than \$1000 in large quantities.

A second application is the micro UAV. An IR uncooled 8-12 micron sensor, GPS, transmitter, acoustic sensor, micro laser rangefinder, and a 1-2.55 (overcast starlight capability) micron sensor would be mounted in a UAV. Such a UAV may be tube launched (such as TOW missile launcher) and have a range of at least 10 kilometers and an altitude of at least 300 meters. The UAV would contain a parafoil to reduce the power requirements. The sensor should be able to recognize a man at 500 meters. All ideas for reduced power management size, weight, and audible noise shall be considered and will be a top priority. Another UAV application could be a miniaturized helicopter. This helicopter would contain the same type of sensors as the tube launched air vehicle. Direction of flight, azimuth and down angle of camera, and GPS position shall be provided to precisely locate a point on the ground for targeting purposes. In the military mode the cost versus mission value of the sensors should approach "throw-away" status, however the sensors should be recoverable and reissued when possible. In the civilian use mode, alternative air vehicles could be used. Also the configuration of the platform will automatically ensure its safety, even with loss of power. The offeror shall provide a trade-off analysis of imaging performance at varying ranges and altitudes, size, weight, power, and impact on platform vulnerability.

A third application is the guarding of mine fields. A set of unattended micro sensors in the far IR (8-12 microns) will cover the perimeter of a minefield and transmit back images of any intrusions. The sensors will have a man ID range of at least 300 meters and be linked together. Power management shall be the utmost of importance so that these sensors can last for over 6 months without attention. All power sources shall be considered with the largest watt-hour per pound being the highest priority. Other applications include guarding borders (civilian), military installations, nuclear facilities, airports, etc. and as a non line of sight sensor network in the battlefield for the individual soldier. Low cost shall be a very high priority for this application.

ESTIMATED MAXIMUM FEDERAL FUNDING CONTRIBUTION: \$20M

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TITLE: SMART ANTENNA APPLICATIONS FOR ARMY AIRBORNE RECONNAISSANCE SYSTEMS

OBJECTIVE: Current communication systems use low power complex modulations that utilize the frequency spectrum in a very efficient manner. In particular, cellular and PCS systems utilize various methods such as spatial filtering and sectorization to maximize the use of the frequency spectrum. The objective of this Dual-application program would be to develop "smart" antennas that consist of directional antenna arrays that are controlled by sophisticated digital signal processing (DSP) algorithms. The algorithms will maximize the gain pattern of the antenna array to maximize the performance of the antenna array and improve the SNR at the array output. The objective of the antenna array will be to pick up the low power signals amongst various interference signals from a wide variety of platforms, including airborne platforms.

DESCRIPTION: The development and availability of smart antennas will benefit both the military and commercial sectors by improving the quality and capabilities of PCS/cellular systems and Army airborne reconnaissance systems. The SMART antenna will process the desired signal while filtering out interfering signals such as thermal noise, multi-path, and co-channel interference. The end result would be an improved signal to noise ratio which would improve the sensitivity of the receiver systems. Both basic classes of smart antennas should be explored which includes switched beam and adaptive array antennas. The development of powerful digital signal processing algorithms will be critical the SMART antenna and will need to handle frequency across the communications spectrum and be able to single out individual channels.

ESTIMATED MAXIMUM FEDERAL FUNDING CONTRIBUTION: 1M

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TITLE: RADAR FLASHLIGHT FOR THROUGH-WALL DETECTION OF HUMANS

OBJECTIVE: Develop a completely hand-held, self-contained radar system for the detection of humans through obstacles or behind walls. Applications for such a system include, but not limited to, U.S. Customs Service (USCS) applications or for use by military quick reaction forces. CECOM routinely works with USCS to provide them new technologies for use at border crossings and other ports of entry for detection of contraband and other items in incoming cargo and other containers. This "RADAR flashlight" could potentially be used to detect illegal immigrants hidden behind false walls in trucks, ship containers, or other large containers without having to unpack and repack the entire contents. This could potentially save several hours of manpower per container. Also, this system could be developed for use by infantry or quick reaction forces to locate human targets or determine if a room is empty before entering. Since the system is designed to detect Doppler shifts, it could potentially detect persons through thicker obstructions or from a further range from the obstruction if they are moving around because the Doppler shift would be much greater than that of a heartbeat.

DESCRIPTION: Georgia Tech Research Institute is currently developing a low-power, handheld, microwave radar system capable of detecting minute movement through door, walls or other obstructions. The current prototype, which resembles a large flashlight, has been able to detect movement as small as a human heartbeat. Originally, this system was intended as a radar vital signs monitor for live-fire situations on the battlefield to determine if a soldier was still alive before attempting a rescue. The system has also been considered for use in hostage situations and for locating survivors after earthquakes or other accidents. The current prototype consists of the "RADAR flashlight", an external signal processor and a host computer for displaying the signal for analysis. Further development could be done to reduce the overall size of the system, including integrating the signal processor into the handheld radar unit. The system could ultimately be developed to run independent of a host computer. Additionally, the system could be enhanced to allow it to be operated on the move, where currently the radar must be stationary while receiving the signal.

ESTIMATED MAXIMUM FEDERAL FUNDING CONTRIBUTION: \$500

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Aircraft Sustainment

TITLE: ENVIRONMENTALLY SAFE CORROSION PREVENTION AND CONTROL

OBJECTIVE: This broad program will address corrosion in several areas of pressing need affecting the life cycle costs and readiness of Army materiel such as howitzers (both towed and self-propelled), trucks and helicopters. Much of the money spent for corrosion prevention is for plating environmentally hazardous coatings such as cadmium and chromium, as well as many other metals. These coatings must be reapplied periodically which exposes both the troops and depot personnel to carcinogens such as hexavalent chrome, nickel and cadmium. In order to comply with OSHA and EPA requirements these facilities must install special protective and abatement equipment, and institute special procedures to protect the workers. These costs are not captured in the costs normally associated with corrosion and could easily contribute to a doubling of the costs associated with corrosion protection. Alternative coating and plating technologies are sought which are more compliant with current and planned environmental and occupational health regulations and requirements. Reducing environmental regulation and control reduces costs and frees up resources for training, quality of life improvements and modernization. All of the coatings and plating methods are directly translatable to the automotive industry, construction equipment, the fastener industry, and any commercial plating application that exists in the United States. The environmental impact of the new coatings can be extremely beneficial to small businesses that are faced with ever increasing regulatory and reporting requirements.

DESCRIPTION: This topic seeks the development of corrosion prevention and control technologies in several areas:

- a. Alternatives to hard chromium coatings that can coat blind holes and sharp corners, can be applied as thick coating or as a flash coating, can be easily stripped and reworked, can be economically finished to the quality by grinding or superfinishing, and will conform to current and planned environmental and occupational safety regulations and requirements.
- b. Chromium-free pretreatment for aluminum that meets the functional requirements of MIL-C-5541, including providing the required corrosion resistance.
- c. Chrome-free anodizing solutions that are capable of providing pretreatment for the adhesive bonding of titanium, magnesium and aluminum.
- d. Alternatives for electroplated cadmium that exhibit a fatigue debit that is less than or equal to cadmium, exhibit torque/tension behavior similar to cadmium, provide similar electrical properties, exhibit little hydrogen embrittlement, can be used to coat large number of small parts, and can be stripped and reworked easily (Coatings should be stand alone, as well as have the ability to adhere to additional organic coatings).
- e. Alternatives to cyanide silver and copper plating.

f. New analytic methods, testing alternatives to ASTM B-117, nondestructive tests, and real time sensing and control methods to characterize and qualify the new coatings and processes.

ESTIMATED MAXIMUM FEDERAL FUNDING CONTRIBUTION: \$500K

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ATTN: D. McGinley

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TITLE: PASSENGER AND COMMUNITY ACCEPTANCE OF ROTORCRAFT

OBJECTIVE: Develop technology that will make rotorcraft more acceptable to the passengers it carries and the community over which it flies. It is estimated that at least 85% of the technology used to develop rotorcraft is the same ñ be it a commercial or a military vehicle. Proposals must focus on this area of commonality.

DESCRIPTION: Conventional wisdom holds that potential rotorcraft passengers view rotorcraft as unsafe and noisy (compared to a fixed wing aircraft) and uncomfortable (high vibration and noise levels). Proposals that present innovative, feasible, and affordable concepts to overcome these perceptions are solicited. Examples of technologies which it is envisioned can lead to wider acceptance of rotorcraft by passengers and the community include internal and external noise reduction, vibration reduction, active blade control concepts for noise and vibration reduction, smart structures and materials, safety (crashworthiness, reduction of flight-critical components), and reliability. Successful proposals in this topic area will develop technologies that can be economically applied to either existing or future rotorcraft.

ESTIMATED FEDERAL FUNDING CONTRIBUTION: \$ 1M

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Notes:

The term "rotorcraft" is used to mean any low disc-loading, vertical take-off and landing (VTOL) aircraft, such as a helicopter or tilt rotor.

Single proposals that address multiple NRTC topic areas are acceptable and encouraged.

**TITLE: PROCESS AND PRODUCT IMPROVEMENT FOR AFFORDABILITY,
QUALITY AND ENVIRONMENTAL COMPLIANCE OF ROTORCRAFT**

OBJECTIVE: Develop technology for improving the processes or products used in the design and manufacturing of rotorcraft parts, subsystems, and total systems in order to make them more affordable with increased quality while complying with any environmental requirements. It is estimated that at least 85% of the technology used to develop rotorcraft is the same ñ be it a commercial or a military vehicle. Proposals must focus on this area of commonality.

DESCRIPTION: Many processes and intermediate products are used in the design and manufacturing of rotorcraft. Technology can be used to reduce the cost of rotorcraft by improving or replacing these existing processes and products. Technology can also be used to enhance the quality of the intermediate and ultimate products. Technology can also be used to reduce or eliminate conflicts between existing/new processes and environmental constraints. Proposals that present innovative, feasible, and affordable concepts to such processes and products are solicited. Examples of technologies which it is envisioned can lead to improved processes and products include integrated design tools development, rapid prototyping fabrication, design optimization, structural efficiency of composite and metallic materials, composite structures, high temperature composite applications, fiber thermoset materials, structural joining technologies, low cost resin transfer molding technology, high speed machining technology, crashworthy structures, crash safety, and life prediction and damage tolerance for composite and metallic materials. Successful proposals in this topic area will develop technologies that can be economically applied to either existing or future rotorcraft.

ESTIMATED FEDERAL FUNDING CONTRIBUTION: \$ 1.5M

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Notes:

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Single proposals that address multiple NRTC topic areas are acceptable and encouraged.

TITLE: TECHNOLOGIES TO SUPPORT HARMONIZED CIVIL CERTIFICATION AND MILITARY QUALIFICATION OF ROTORCRAFT

OBJECTIVE: Develop technology that can bring the analysis and testing requirements of civil certification and military qualification of rotorcraft into closer harmony. Develop technology that minimizes the need to perform analyses or testing that are unique to civil certification or unique to military qualification or to repeat analyses or testing that are very similar for certification and qualification. It is estimated that at least 85% of the technology used to develop rotorcraft is the same ñ be it a commercial or a military vehicle. Proposals must focus on this area of commonality.

DESCRIPTION: The Federal Aviation Administration (FAA) certifies aircraft; the military qualifies aircraft. Currently, there are many situations where certain analyses or testing are required for civil certification while similar (but not identical) analyses or testing are required in the course of military qualification. There is a need to identify and develop technology that will allow analyses or tests to be performed once and then be used as the basis for both certification and qualification. The objective is NOT to write new specifications. Rather, it is to develop the technological basis and justification for using a common or harmonized set of analyses or tests to substantiate that a rotorcraft is suitable to be both certified (by the FAA) and qualified (by the military). Doing so is expected to substantially reduce the cost of performing both a certification and a qualification for a given rotorcraft. Successful proposals in this topic area will develop technologies that can be economically applied to either existing or future rotorcraft.

ESTIMATED FEDERAL FUNDING CONTRIBUTION: \$ 0.5M

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Notes:

The term "rotorcraft" is used to mean any low disc-loading, vertical take-off and landing (VTOL) aircraft, such as a helicopter or tilt rotor.

Single proposals that address multiple NRTC topic areas are acceptable and encouraged.

TITLE: INTEGRATED PLATFORM ELECTRONICS FOR MANNED / UNMANNED ROTORCRAFT

OBJECTIVE: Develop and demonstrate the technologies that will provide an open system architecture for military and civil rotorcraft (legacy and new), allowing the physical and functional integration of emerging technologies for existing and future manned and unmanned rotorcraft platforms. Emphasis will be placed on the system level aspects of the architecture, particularly the integration of the sensors with other rotorcraft platform functions such as CNI, ASE/EW, Crew Stations, etc. Commonality, shared resources and the use of commercial-off-the-shelf (COTS) will be stressed. Products to be delivered include functional descriptions and design standards for high speed networks, integrated apertures, common radio frequency (RF) modules, integrated processors including reusable software, and advanced packaging and cooling concepts. Payoffs include an architecture which would be easily reconfigurable for multi-mission and multi-platform (COTS based where practical), use of shared resources, and readily upgradable (affordable) with emerging technology to achieve increases in functionally / capabilities for military and civil platforms. Use of an avionics open architecture approach would also move toward eliminating the electronic parts obsolescence problem for the avionics suite of components. The benefit of a “plug and play” capability for the avionics suite of components, would eliminate the diminishing electronic component source suppliers problem for rotorcraft and aid in controlling the cost of producing components because of their capability to be “plugged in” to any open architecture.

DESCRIPTION: The technical approach includes an assessment of the architectures for military and civil rotorcraft platforms and their applicability, through Horizontal Technology Integration (HTI), to ground platforms; modeling of potential architecture upgrades; identification of the common technologies across platforms which would lend themselves to an open architecture approach; and a series of escalating demonstrations of the open, integrated architecture for rotorcraft. Technologies developed by DARPA as well as the OSD Open Systems Joint Task Force and JTA-A compliance are an integral part of this approach. A 30% reduction in size and weight by the use of common modules and multi-function apertures along with significantly increased optempo operations on the Digital Battlefield and populated cities around the world.

ESTIMATED MAXIMUM FEDERAL FUNDING CONTRIBUTION: \$1.8M

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Fuel Efficiency And Advanced Propulsion Technology

TITLE: ENHANCED ROTORCRAFT PERFORMANCE

OBJECTIVE: Develop technology that enhances the rotorcraft performance capabilities, including maneuverability and agility. It is estimated that at least 85% of the technology used to develop rotorcraft is the same ñ be it a commercial or a military vehicle. Proposals must focus on this area of commonality.

DESCRIPTION: Rotorcraft have yet to reach their maximum capabilities in terms of efficiency and magnitude of flight and maneuvering performance. There are significant opportunities to fly faster, longer ranges, higher payload, and pull more g's with less power, to reduce adverse aerodynamic forces (like drag, interferences, and download), and to not be limited by blade or control system loads when maneuvering. Proposals that present innovative, feasible, and affordable concepts to reduce these limitations are solicited. Examples of technologies which it is envisioned can lead to enhanced rotorcraft performance include aerodynamic efficiency, load and vibration reduction, high figure of merit, aerodynamic interferences, dynamic systems stability, maneuverability/agility, active blade control technology, and smart structures/materials. Successful proposals in this topic area will develop technologies that can be economically applied to either existing or future rotorcraft.

ESTIMATED FEDERAL FUNDING CONTRIBUTION: \$ 1M

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Notes:

The term "rotorcraft" is used to mean any low disc-loading, vertical take-off and landing (VTOL) aircraft, such as a helicopter or tilt rotor.

Single proposals that address multiple NRTC topic areas are acceptable and encouraged.

TITLE: EXPANDED ROTORCRAFT OPERATIONS

OBJECTIVE: Develop technology that will expand the operational flight envelope of rotorcraft in terms of being able to fly in all weather conditions and in any type of terrain. Develop technology that will provide new operational capabilities for rotorcraft and open new markets for commercial rotorcraft that can also be applied to new missions for military rotorcraft (or vice versa). It is estimated that at least 85% of the technology used to develop rotorcraft is the same ñ be it a commercial or a military vehicle. Proposals must focus on this area of commonality.

DESCRIPTION: Compared to fixed wing aircraft, rotorcraft are limited in terms of the weather in which they are allowed to operate. Both civilian and military operators have a strong desire to have significantly increased flexibility in terms of the environments in which they can operate ñ safely, or at all. Technology could be used to provide the capability to operate rotorcraft in more severe wind and/or icing conditions, to use them in even more confined areas, or use them in operations never before envisioned. For example, if a rotorcraft had more of a particular mode of maneuverability or agility, there might be an operation that it could then perform which it had never previously been able to do. This situation could open up new markets or missions to rotorcraft. Examples of technologies which it is envisioned can lead to expanded rotorcraft operations include carefree controls, active flight control technology, handling qualities research, all-weather and all-terrain operation, situational awareness technology, HUMS technology, advanced rotorcraft crew systems, reliability, and rotorcraft safety. Successful proposals in this topic area will develop technologies that can be economically applied to either existing or future rotorcraft.

ESTIMATED FEDERAL FUNDING CONTRIBUTION: \$ 1M

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Notes:

The term "rotorcraft" is used to mean any low disc-loading, vertical take-off and landing (VTOL) aircraft, such as a helicopter or tilt rotor.

Single proposals that address multiple NRTC topic areas are acceptable and encouraged.

TITLE: VARIABLE GEOMETRY ADVANCED ROTOR TECHNOLOGY (VGART)

OBJECTIVE: Develop affordable advanced rotor technology concepts that will reduce helicopter fuel consumption while significantly increasing range, payload and aircraft maneuverability/agility. Reduction in rotorcraft vibration and noise will also be emphasized. The Army After Next (AAN) advanced airframe requirements for range, payload, and cost cannot be met with current technologies. The rotor technologies developed under this program will benefit future tri-service large cargo rotorcraft and will be transferable to the commercial rotorcraft industry. The commercial rotorcraft industry will reap the benefits of improved performance and comfort, lower operational cost through less fuel consumption, and environmental compatibility due reduced noise footprint.

DESCRIPTION: Four high-risk, variable geometry, rotor concepts will be developed including active on-blade control, active twist, high lift and variable diameter. The concepts must be able to achieve reduction in rotorcraft vibration, rotor blade maximum loading increases and increases in rotor/propeller efficiency. The feasibility of critical subsystem components must be established before any of these concepts can be demonstrated in flight. The technology products will include detailed designs of critical rotor components, bench-tested components for a variable-geometry rotor, decision criteria for concept down-select, and mature knowledge for all candidate concepts for future flight demonstration. Successful lab demos of the critical components will allow for leap-ahead rotorcraft platform performance and affordability. Successful proposals in this topic area will develop critical component technologies for a follow-on program to flight – demonstrate affordable leap-ahead “rotor system” performance for AAN requirements.

ESTIMATED MAXIMUM FEDERAL FUNDING CONTRIBUTION: \$9.0 M

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TITLE: VEHICLE AND OCCUPANT SAFETY

OBJECTIVE: Develop safety technologies and/or training that will substantially reduce damage and injury costs associated with vehicle accidents. New propulsion systems, which permit higher vehicle speeds, have the potential to contribute to an increase in the number of vehicle accidents. Insertion of safety technology into vehicles that use advanced propulsion will benefit both military and commercial applications by reducing accidents and injuries.

DESCRIPTION: The identification, development, and demonstration of accident and injury prevention cost saving safety technologies to benefit both the military and the commercial sectors are needed. By meeting and validating cost and affordability goals, technologies for the emerging 21st Century can be offered to customers as accidents reduction solutions. Three key technologies are emphasized: (1) Collision prevention, (2) Occupant survivability, and (3) Damage reduction. Two key training activities are emphasized: (1) driver training and (2) vehicle diagnostics/repair. Successful proposals in this topic area will demonstrate safety technologies that substantially reduce costs associated with accidents and prevent injury of occupants.

ESTIMATED MAXIMUM FEDERAL FUNDING CONTRIBUTION: \$ 1M

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Submit Proposals to:

U.S. Army TACOM - TARDEC

AMSTA-AQ-LGCM, MS 274

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**TITLE: HIGH PERFORMANCE/LOW EMISSIONS, LOWER FUEL CONSUMPTION,
AND IMPROVED MAINTENANCE LIGHT/MEDIUM TEST BED**

OBJECTIVE: Develop a new light/medium (2 Ton to 10 Ton curb weight) demonstrator capable of achieving substantial life cycle cost reduction and extended life of vehicles in these weight classes, utilizing the five key technologies cited herein. Reduced fuel consumption, vehicle emissions, and maintenance burdens (repair and labor costs) are goals applicable to both military and commercial sectors. The need for these reductions is pervasive among all of the Services due to the cost and logistics burden of supplying fuel to combat forces and maintaining vehicle readiness. Increased number of vehicles, enhanced safety, lower cost, and environmental friendliness, while still increasing power/energy density and reducing operational costs, will be directly applicable to both the military and commercial markets.

DESCRIPTION: Fuel constitutes 70% of bulk tonnage needed to sustain a military force on the battlefield and commercial trucks burn more fuel than cars, while corrosion is one of the principal reasons for scrappage of vehicles. Therefore, development and availability of alternative power sources and vehicle structural designs that will result in lighter weight and in cost savings due to decreased fuel consumption, vehicle maintenance, lower emissions, and extended vehicle life will benefit both the military and commercial sectors by increasing system-life goals, meeting affordability goals, and complying with current and emerging 21st Century environmental regulations. Five key technologies are emphasized: 1) High speed direct injection diesel engines with bottoming cycle to recoup wasted heat and drive regenerative power, 2) Hybrid electrical power system incorporating above diesel engines and improved power storage devices, 3) Compact improved power storage devices (fuel cell technology) with diesel fuel reformers, 4) Elevated temperature (90 degrees C) electrical power conditioning, and 5) Reduced wind resistance streamlined vehicle designs utilizing alternative structural materials which will decrease vehicle curb weight by 30-60% and increase vehicle life by significantly reducing corrosion/erosion and road damage effects while meeting environmental regulations (EPA/OSHA) and Army performance requirements.

ESTIMATED FEDERAL FUNDING CONTRIBUTION: \$15M (over two years)

GOVT POC: Marlene Ross

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Submit Proposals to:

U.S. Army TACOM - TARDEC

AMSTA-AQ-LGCM, MS 274

ATTN: Marlene Ross

Warren, Michigan 48397-5000

TITLE: Manportable Fuel Cell Hybrids

OBJECTIVE: Design and develop small, lightweight, high power density, high energy density hybrid power sources. A hybrid system includes a high power component (to satisfy pulse requirements) and a high energy component (to support background steady-state loads and recharge the high power component, if applicable). These energy efficient, cost-effective devices will be based on manportable fuel cells (high energy density) combined with high power density devices (batteries, capacitors, etc.). Optimize materials, components, interfaces, and system design configurations to provide maximum power and energy. Demonstrate design concepts that extend transmission range and operating time in Army C4I communications-electronics equipment as well as provide adequate power and energy to replace small commercial generators and energy storage devices. The proposed and scaled up versions of the hybrid power source could be applied to both military and commercial applications requiring remote power supply. Some of the examples include the following: remote communications equipment (radios, phones), data acquisition systems (sensors), lighting (including emergency); back-up power for command, communications and data centers, home (UPS, sump-pump), boats and airplanes (APU); portable field generators for mission and recreational auxiliary power packs; transportation department (message signs, advisory radio, traffic signal lights, fog/ ozone/ traffic volume sensors, emergency call boxes, remote cameras, portable highway power generators); and electric vehicles (wheelchairs, golf carts). Many other applications may exist where the extended operational time would warrant the replacement of the batteries.

DESCRIPTION: The goals of this program are to design and develop a 5 to 10 Watt system with 25 to 50 Watt peaks and 72 hours operating time, with 12/24 volt output for future manportable systems such as Land Warrior. The hybrid power source must operate between 0-40°C with a total system weight less than 10 pounds. The system must be safe and orientation insensitive, making material handling and storage critical technical barriers to overcome. Candidate systems with the most promise include Proton Exchange Membrane (PEM) fuel cell/lithium-ion battery and PEM fuel cell/electrochemical capacitor. It is expected that research and development of the materials and components comprising these system configurations will require 24 months of effort to yield proof-of-concept devices for demonstration. This program will rely on commercially available technology as well as components developed for military use, and will serve as a stepping stone for scale up to larger systems.

ESTIMATED MAXIMUM FEDERAL FUNDING CONTRIBUTION: \$500K

GOVT TPOC: Mr. Michael T. Brundage/Dr. Peter Cygan

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SUBMIT PROPOSALS TO:

U.S. Army Communications and Electronics Command

ATTN: AMSEL-RD-DD-TD (Mr. Jackson)

Technology Transfer Office

Ft. Monmouth, NJ 07703-5201

Information Systems and Technology

TITLE: INFORMATION TECHNOLOGIES FOR SIMULATION-BASED ACQUISITION

OBJECTIVE: Develop commercially supported information infrastructure technologies to enable implementation of the Simulation-Based Acquisition policy being brought forward by the Office of the Secretary of Defense. Application of simulation-based acquisition is essential to maintaining U.S. military strength across all services in the face of reduced defense budgets. Primary goals are to develop technologies and products to enhance interaction and streamline technical/cost review between the services and their system contractors, and to manage product information/data over the product development/support life cycle. Information technology products and capabilities developed will have broad applicability across the commercial sector, particularly in manufacturing (e.g., automotive), and in long-lifecycle fleet acquisition and operations support (e.g., commercial air transport, commercial shipping and shipbuilding).

DESCRIPTION: Development, maturation, and commercialization of information technologies for simulation-based acquisition will enable all services to maintain superiority in systems and equipment under reduced defense budgets. Key opportunities exist to reduce system acquisition costs through: (1) Product Modeling to unify system requirements, product data, performance/cost prediction models, and field information, (2) Data Management to maintain product models and related system information across the product development/support lifecycle, (3) Collaborative technologies to enable live interaction of the user, engineering, and support enterprise while accessing the product model and other analysis resources. Successful proposals in this topic area will develop and integrate information infrastructure products that will fill gaps that currently exist in commercial offerings. Proposed solutions should support heterogeneous core applications (i.e., CAD/CAM/CAE applications, Product Data Managers), span multiple life cycle phases (preliminary design, detailed design, production, field support), and support a geographically-distributed enterprise.

ESTIMATED MAXIMUM FEDERAL FUNDING CONTRIBUTION: \$9M

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Submit Proposals to:

U.S. Army TACOM - TARDEC

AMSTA-AQ-LGCM, MS 274

ATTN: Marlene Ross

Warren, Michigan 48397-5000

TITLE: Networked Vehicle Intranet Demonstration System

OBJECTIVE: Develop Vehicle-based Intranet technologies, based on ubiquitous internet technologies, that will enable and facilitate the flow of information throughout the vehicle and between it and ancillary IP-based support services. This includes seamless interoperability with future Logistics and Product Development Extranets, DOT Intelligent Transportation System Internets, as well as the Army Force XXI communications infrastructure. Vehicle-based Intranet technologies will help ensure that battlefield support operations are instantly available to, and interoperable with the soldier and applicable embedded system data and processes. The Vehicle-based Intranet technologies mentioned above are also directly applicable to consumer markets for electronics, automobiles, and information services.

DESCRIPTION: The development of Vehicle based Intranet technologies will be based on a militarized version of a commercial network vehicle and the ongoing development that is currently taking place in the commercial sector. Recently, commercial industry presented a network vehicle concept car at COMDEX 97. This concept car is reviewed at: <http://www.alphaworks.ibm.com/networkvehicle/> and <http://www.javasoft.com/features/1997/nov/javacar.html>. This vehicle, and future commercial and DoD sponsored activities of this type, will benefit both the military industrial base and the commercial sector by providing test beds and demonstrators illustrating the application and importance of commercial Internet technologies to both domains. Furthermore, there is substantial overlap in needs that can be exploited under a dual-use program in this space. The following key technologies are emphasized: (1) vehicle application download from the internet, (2) embedded vehicle and server-side diagnostics, prognostics and monitoring, and (3) distributed component computing. Successful proposals in this topic area will develop vehicle based Intranet technologies that support secure multi-threaded information exchange between onboard systems and vehicle operators (warfighters or combat support personnel), and between external command and control and logistics systems that will be developed by other Army organizations.

ESTIMATED FEDERAL FUNDING CONTRIBUTION: \$9.0 M (over 3 years).

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Submit Proposals to:

U.S. Army TACOM - TARDEC

AMSTA-AQ-LGCM, MS 274

ATTN: Marlene Ross

Warren, Michigan 48397-5000

TITLE: COMMERCIAL-QUALITY MACHINE TRANSLATION FOR ARABIC AND/OR PERSIAN

OBJECTIVE: Develop robust syntactic processing algorithms and large-scale bilingual lexicons that will lead to medium-to-high quality English translations when applied to texts written in Modern Standard Arabic or Persian Farsi. These 2 languages are top- or near top-priority for numerous Army components (e.g., military intelligence, Special Operations) due to continuing unrest, threats of terrorism, and the prospect of low-intensity conflicts in the Gulf region as well as around the Mediterranean. At the same time, given the difficulty of Arabic and Farsi for native speakers of English (they are classified as Category IV – or the most difficult – by the Defense Language Institute), there is a scarcity of Army linguists qualified in these two languages. In order to evaluate and analyze intelligence from captured documents, intercepted messages, and a variety of open-source material, as well as to coordinate with Arabic-speaking allies in the Gulf, U.S. troops need automated means – i.e., software – for determining the meaning and importance of Arabic and Farsi texts. Such software is also directly applicable to commercial ventures involving growing markets in the Middle East.

DESCRIPTION: Arabic and Persian text pose unique problems for machine translation: These languages are typically written without vowels, which together with inflectional morphologies more complex than any other of the world's language families, create unusually dense ambiguities that impede computational analysis and interpretation of text. Because of these difficulties, no commercial-grade machine translation has yet been developed for either language, although bilingual dictionaries and word/phrase replacement software exist in prototype form and in some commercial products. Needed is software that integrates (1) comprehensive syntactic processing and semantic analysis that takes into account context to disambiguate meaning; (2) thorough and deep morphological analysis; (3) full-scale lexicons, partitioned by domain (e.g., military, medical, computer); and (4) good-quality English generation. Successful proposals in this topic area will develop Windows-based machine translation software that is robust and thoroughly tested, and that for most texts performs at between 80 and 90% quality levels on pre-existing government scales for adequacy, informativeness, and intelligibility.

ESTIMATED FEDERAL FUNDING CONTRIBUTION: \$500K

GOVT TPOC: Dr. Melissa Holland

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Submit Proposals to:

Dr. V. Melissa Holland
Language Technology Team Leader
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Adelphi, MD 20783-1145

TITLE: ASIAN-RIM PORTABLE TRANSLATOR

OBJECTIVE: Develop and enhance machine translation software for Asian languages (e.g., Korean, Chinese, Japanese, Thai), resulting in medium-to-high quality Asian-to-English language. Pacific-rim languages are top- or near top-priority for Army components in CINCPAC and other Pacific-related missions. Yet, with exception of Japanese, there exists no commercial-grade software that can produce medium-to-high quality translations. At the same time, given the difficulty of Asian languages for native speakers of English (Korean, Chinese, Thai, Vietnamese, and Japanese are all classified as Category IV – or the most difficult – by the Defense Language Institute), there is a scarcity of Army linguists and Special Operations personnel qualified in these languages. An Asian software suite runs on Windows-based laptops and that can translate from two or more critical Asian languages into English will significantly enhance U.S. Army capability to evaluate and analyze captured documents, intercepted messages, and a variety of open-source material, as well as to coordinate with allied forces in the Pacific, especially Korean. Such a software suite is also directly applicable to commercial ventures involving growing markets in Asia.

DESCRIPTION: . Asian languages present a variety of challenges for machine translation: e.g., word order is typically free; anaphoric pronouns are often omitted, compounding sentence ambiguity; sociolinguistically determined form variants have no direct correspondence in English; verb formation can be enormously complicated and tied to semantics of the object. Because of these and other difficulties, no commercial-grade machine translation has yet been developed except for specialized domains in Japanese. Needed is software that integrates (1) comprehensive syntactic processing and semantic analysis; (2) full-scale lexicons, with thorough accounts of lexical semantics where needed; (3) domain-specific lexicons suitable for military, technical, and general purpose materials; and (4) good-quality English generation. Successful proposals in this topic area will develop Windows-based machine translation software for at least 2 critical Asian languages that is robust and thoroughly tested, and that for most texts performs at between 80 and 90% quality levels on pre-existing government scales for adequacy, informativeness, and intelligibility.

ESTIMATED FEDERAL FUNDING CONTRIBUTION: \$500K

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Adelphi, MD 20783-1145

TITLE: Commercial Audio Management Systems for Army INTEL applications

OBJECTIVE: Current audio management systems in the Guardrail family of INTEL processing facilities utilize unique hardware and software solutions to meet specific security and operational requirements. The objective of this DUAL application program would be to develop an audio management system that is composed of components that utilize commercial standards and protocols that meet the security and operational requirements for current and future INTEL system needs.

DESCRIPTION: The development of an audio management system that meets the operational and security requirements for an INTEL system will benefit both the military and commercial sectors by providing lower cost, more secure and capable systems for both the commercial and military communities. The approach should be a migration from current INTEL audio management systems with an attempt to

- 1) Reduce the operational costs,
- 2) Enhance the operational performance,
- 3) Increase the current audio data throughput,
- 4) Reduce the current size, weight and power requirements ,
- 5) Maximize the utilization of COTS hardware and software for audio signal processing,
- 6) Support existing audio function, meet the current security requirements
- 7) Provide for WAN type audio interfaces

Details of the current system requirements are available upon request.

ESTIMATED MAXIMUM FEDERAL FUNDING CONTRIBUTION: 1M

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SUBMIT PROPOSALS TO:

U.S. Army Communications and Electronics Command
ATTN: AMSEL-RD-DD-TD (Mr. Jackson)
Technology Transfer Office
Ft. Monmouth, NJ 07703-5201

TITLE: C2 Protect for Information Operations

Objective: The focus of this effort is to develop C2 Protect countermeasures for mobile digitized communications and information networks such as those being deployed to the Army's First Digitized Division (FDD.) The security countermeasures should protect against, detect, and respond to network-based attacks using means in addition to encryption. Specifically, network access control, intrusion detection and response, host level improvements, and security management should be addressed.

The security solutions must be integrated and proven within the bandwidth and connectivity constraints of the Tactical Internet (TI) at all its levels. Consideration should also be given to C2 Protect countermeasures which help secure connections between the TI and external networks such as Secret Internet Protocol Router Network (SIPRNET) and the Not Classified Internet Protocol Router Network (NIPRNET.)

The Army's TI will be the basic communications infrastructure used in the digital battlefield. Components that comprise the TI are host computers (Applique, Army Tactical Command and Control Systems (ATCCS,) Global Command and Control System-Army,) routers/switches (Internet Controllers (INC,) commercial routers, WIN ATM switches,) radios (Single Channel Ground and Airborne Radio System (SINCGARS,) Enhanced Position Location and Reporting System (EPLRS,) Near Term Digital Radio (NTDR,) High Capacity Line of Sight trunk radios.) Range extension is accomplished through the use of Satellite Communications assets such as Global Broadcast System, Secure Mobile Anti-jam Reliable Tactical Terminal (SMART-T,) and Trojan Spirit.

The security areas within the TI that need to be enhanced are outlined below. It is noted that the TI approach and design itself is going to be changing into a "Next Generation TI," and this topic shall target security solutions that also take in consideration the "new" design.

Description:

Network Access Control: Methods of incorporating access control in the following areas should be addressed:

- User identification and authentication - candidate areas include secure password generation, biometrics, one-time password techniques, and token based authentication.
- Security improvements to the router and network management protocols
- Cryptographic authentication

Auditing and Intrusion Detection/Response: The inclusion of an intrusion detection capability should be addressed to detect insider and outsider attacks. The Intrusion Detection mechanism should also direct the system administrator's attention to high risk sessions and provide guidance to discern where and when alarms must be initiated to indicate intrusion.

Effective automated and human response mechanisms should also be addressed, to include reacting to intrusions, alerting system administrators and users, identifying and possibly eliminating attackers, and performing damage assessment and repair. In addition, the response mechanism should inform the commander of the consequences and impact of a particular response.

Host Protection Devices: Improvements to the host systems residing on the TI to include both Applique and ATTCS hosts should be addressed, specifically in the areas of C2 Protect tools and malicious code detection and eradication mechanisms.

Security Management: Investigate the development of management tools that allow the enforcement of a designated security policy amongst the various prevent, detect and response mechanisms. Identify interrelationships and interdependencies among the C2 Protect components. Develop ways to dynamically enforce new security policies due to changing user roles, operational requirements, or security modes.

Notes:

1. The DUAP BAA C2 Protect topic has priority over the same topic under the existing CECOM Space & Terrestrial Communications Directorate BAA. Proposals submitted for the latter BAA will not be considered until the DUAP proposal submittal and evaluation period has ended.
2. It is recommended that the POC below be contacted and that white papers be submitted prior to submitting a formal proposal.
3. Teaming with commercial technology houses and companies who do not traditionally compete for Government contracts is strongly encouraged.
4. Descriptions of most of the military components listed above are described in the C4IEWS FY98 Project Book, which may be found at www.monmouth.army.mil, under the topic "Team C4IEWS 1998 Project Book," category "PEO C3S."
5. CECOM STCD has evaluated many COTS/GOTS C2 Protect tools in several categories described above, for potential use in the Applique/INC/EPLRS/SINGARS portion of the Tactical Internet. Similar evaluations are currently taking place for the Army Battle Command System (ABCS.) If the proposal will address some of the capabilities found in COTS/GOTS, it is recommended that the proposal describe what additional benefits to existing COTS/GOTS will be provided, and why it is worthwhile for the Army to pursue versus buying existing COTS/GOTS.

ESTIMATED MAXIMUM FEDERAL FUNDING CONTRIBUTION: \$3M.

POC: Peter Van Syckle (Fort Monmouth)

Phone: (732) 427- 4647

SUBMIT PROPOSALS TO:

U.S. Army Communications and Electronics Command

ATTN: AMSEL-RD-DD-TD (Mr. Jackson)

Technology Transfer Office

Ft. Monmouth, NJ 07703-5201

TITLE: UNIVERSAL PCS/MSS HANDSET

OBJECTIVE: Develop and evaluate multi-mode Personal Communications Systems (PCS) handsets to facilitate the objective of one common handset for all user applications. The handset needs to be programmable to allow for the integration of current and future third party waveforms and protocols. The handset architecture requires the flexibility to add security encryption features. Future requirements will also include multiple frequency band operation for worldwide use. This vision, of one common handset is shared by the Army and commercial industry and fits with the concept, one phone wherever you go.

DESCRIPTION: The Army vision for handheld voice Personal Communications Systems (PCS) revolves around a single handset. This handset would allow the user to access all available terrestrially based PCS systems, local wireless loop systems (for building applications), satellite PCS systems, and peer-to-peer communications when there is no infrastructure present. The near term emerging PCS/Mobile Satellite Service (MSS) handsets allow the user to achieve only part of this vision. Additional waveforms and protocols are required to meet all the Army wireless handset voice needs.

This effort expands upon current commercial initiatives in this area and will allow the evaluation of current handset technology to handle multiple waveforms. This effort will develop and evaluate the technologies required to provide this single, common handset. As part of this effort a prototype testbed handset will be developed for testing and analysis. This goal will be achieved by developing a handset that will allow the addition of third party waveforms. An evaluation of the addition of current and emerging PCS and Peer-to-Peer waveforms will determine an acceptable path toward the common handset. The software implementation of additional waveforms on these handsets will be the first step in moving toward the Army's ultimate vision, one common handset.

ESTIMATED MAXIMUM FEDERAL FUNDING CONTRIBUTION \$1M

GOVT TPOC: Frank Loso

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SUBMIT PROPOSALS TO:

U.S. Army Communications and Electronics Command

ATTN: AMSEL-RD-DD-TD (Mr. Jackson)

Technology Transfer Office

Ft. Monmouth, NJ 07703-5201

TITLE: Internet Attack Simulator

OBJECTIVE: The objective of this proposed program is to develop a capability for simulating attacks that are likely to be encountered against networks based on commercial Internet technology. This will support test and evaluation of protection schemes designed to ensure the integrity of the network. When integrated in a distributed simulation environment, using the High-Level Architecture (HLA), the capability will support man-in-the-loop virtual simulation experimentation supporting training and development of Tactics, Techniques, and Procedures (TTP) in a hostile C3 environment. Government advocates for this effort would include DISC4, CECOM, DARPA, TRADOC (Signal Center) and DISA. Many security concerns of internet use have surfaced in the commercial sector as well. The financial, banking, securities, and medical as well as other industries have reported incidents of malicious attacks on information infrastructures based on internet technologies. The benefits of information security techniques developed to support military information systems could be directly realized by commercial industry. The attack simulator will provide a means of testing and certifying commercial information systems.

DESCRIPTION: As the Army moves towards the digitization of the battlefield, a key component of the systems architecture will be the Tactical Internet. The Tactical Internet is composed of many communications components that provide the communications infrastructure to pass digital voice, data and imagery around the battlefield. Each of these components (radios, routers, switches, gateways, and terminals) is susceptible to intrusion with the intent to disrupt battlefield operations. The Internet has changed the way information is transferred throughout the world. As a technology, though, it is still relatively immature. As such, and because of the confidential and secure requirements of the data being transmitted over the Internet, it has become a point of security vulnerabilities for both commercial and military interests. As internet technology matures, the security aspects of information protection for both military and commercial utilization of this technology will need to grow along with it. Technologies developed as part of this program will be useful in identifying, analyzing and defining approaches to secure and protect information and the Internet infrastructure. The successful offerer will maintain licensing rights to software developed under the program and will grant site licenses to the Government. Under this agreement, the Government will have the right to modify the software to include classified attack data.

ESTIMATED MAXIMUM FEDERAL FUNDING CONTRIBUTION \$300K

GOVT TPOC: John R. Mostow, Jr.

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SUBMIT PROPOSALS TO:

U.S. Army Communications and Electronics Command

ATTN: AMSEL-RD-DD-TD (Mr. Jackson)

Technology Transfer Office

Ft. Monmouth, NJ 07703-5201

Topic: Quality of Service for IP Technology

Objective:

Desktop teleconferencing development has taken two distinct paths. One path is “data-centric” that emphasizes data sharing and white boarding best associated with narrowband ISDN (N-ISDN) and guaranteed quality of service (QOS). The other is “video-centric” concentrating on inexpensive transmission of IP-based voice and IP-based video data of “acceptable” quality currently supporting non-guaranteed QOS.

There is the family of open standards known as the ITU-T Recommendations T.12X supporting multipoint data conferencing. The T.12X family attributes are “seamless” multipoint data delivery supporting concurrent viewing, sharing, modifying, and exchanging of data files. The fact that the T.12X family permits interoperability means that applications from several vendors can work together. The T.12X family also permits error free data and multicast-enabled delivery of data to a select sub-group of participants that is network independent, supports varied topologies, scalable, and coexists with other network standards.

Delivery of standardized data flow, associated with integrated voice, data and video, is best be defined by the family of ITU-T Recommendations H.32X whether “data- or video-centric”. The next logical advance in desktop conferencing technology is to extent guaranteed QOS to standardized data flow supported by local area networks. Two of these standards are ITU-T Recommendation H.322 and ITU-T Recommendation H.323 supporting multimedia applications over local area networks (LANs). ITU-T Recommendation H.322 supports guaranteed QOS but is currently underutilized. ITU-T Recommendation H.323 provides non-guaranteed QOS with wide use in the government and industry.

Description:

The focus of this proposed effort is to explore ways to achieve the required, guaranteed QOS, associated with real-time, IP-based, multimedia communications over tactical and commercial, asynchronous transfer mode (ATM) backbone networks. Specifically, investigate and develop technology capable of guaranteed QOS LAN support to IP-based voice, data and video flows that meet the family of ITU-T Recommendations H.32X/T.12X. The issue of guaranteed QOS for ATM network support of integrated IP-based, voice, data and video over LAN also requires addressing for tactical and commercial, multimedia communication, operating over a point-to-point, point-to-multipoint, and multipoint-to-multipoint ATM connection(s). The proposed program will, therefore, explore and develop techniques in light of the LAN support to the new efficient, compressed, voice and multimedia encoding techniques existing or under development by the government and industry.

ESTIMATED MAXIMUM FEDERAL FUNDING CONTRIBUTION \$400K

POC: Steven Bleier (Fort Monmouth)

Phone: (732) 427-2186

SUBMIT PROPOSALS TO:

U.S. Army Communications and Electronics Command
ATTN: AMSEL-RD-DD-TD (Mr. Jackson)
Technology Transfer Office
Ft. Monmouth, NJ 07703-5201

TITLE: Metadata Tools for C2, DOD, and Dual-Use Applications

OBJECTIVE: Develop tools and technologies for metadata creation, management, and use for Command and Control (C2), DOD, and Dual-Use Applications, based on emerging metadata standards. Specific deliverables, in rough Army priority order, could include:

- a. Authoring tools for tagging content with metadata, either manually, automatically, or semi-automatically, for use on new and legacy content.
- b. Metadata servers to respond to authorized queries. Could include user capability to obtain and prove such authorization.
- c. Metadata search language/tools, to enable a user to efficiently describe what should be searched for. Could include agents and user profiling.
- d. Robust repository tools and systems to enable large enterprises, such as DOD, to create, manage, and evolve metadata repositories

This list is provided as a rough guide. Offerors should propose what they believe are the next key products needed by both the Army and commercial customers, based on advances in technology, the Web, and various standards bodies such as W3C, IEEE, NCITS, etc. Offerors are not expected to deliver all of the above, and are encouraged to propose other key items they believe are ready for productization.

DESCRIPTION: Metadata is information about an object, be it physical or digital. The combination of the Information Revolution and the World Wide Web has resulted in an explosion of available information, but no way to intelligently search through it beyond basic key-word matching. Mr. Tim Berners-Lee, recognized father of the Web, has stated, "Metadata [is the] key to moving [the] Web from chaos to quality." Ms. Dawn Hartley, DII COE Chief Engineer, has called for a DOD-wide metadata solution. Emerging standards are now providing a blueprint for implementation, but various tools and technologies will still be needed to manually author, automatically generate, and manage multiple and evolving repositories of this metadata. Commercial markets for the above products and services will exist in any field with large amounts of data that need to be found and used, including education, corporate training, medicine, finance, corporate intranets, etc. It is expected that functioning products will be delivered to both the Army and commercial customers and that the offeror will continue to improve the commercial products after contract completion. The Army will have the right to purchase these improved follow-on products at commercial prices.

ESTIMATED MAXIMUM FEDERAL FUNDING CONTRIBUTION \$400K

GOVT POC: James R. Schoening

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SUBMIT PROPOSALS TO:

U.S. Army Communications and Electronics Command

ATTN: AMSEL-RD-DD-TD (Mr. Jackson)

Technology Transfer Office

Ft. Monmouth, NJ 07703-5201

TITLE: ENHANCED TERRESTRIAL PCS TECHNOLOGY FOR TACTICAL APPLICATIONS.

OBJECTIVE: The objective of this effort is to enhance commercial CDMA cellular systems, currently being adapted to tactical applications, to provide system elements that safeguard against identified inherent system vulnerabilities. These developments may be exploited in both tactical and commercial applications. Development in this area can be targeted to protecting user sensitive information that would enhance subscriber anonymity and privacy. Another area of interest is resolution of potential "spoofing" techniques. One method of improving system vulnerabilities is to foster the development of a GSM-CDMA interface which has the potential to include GSM system features that protect subscriber information and to maintain the advantages of having the CDMA Air Interface. Development in this area would also greatly increase joint interoperability with NATO countries such as the UK.

DESCRIPTION: Incorporation of Terrestrial PCS technology within the tactical battlefield would greatly enhance subscriber mobility and set-up. Utilization of CDMA technology is the preferred digital technology as CDMA reduces frequency management and offers greater capacity. A limitation of this technology is inherent system vulnerabilities that this program will address. Development of solutions to solve these vulnerabilities would enhance the utility of these systems in the battlefield.

ESTIMATED MAXIMUM FEDERAL FUNDING CONTRIBUTION \$1.6M

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SUBMIT PROPOSALS TO:

U.S. Army Communications and Electronics Command
ATTN: AMSEL-RD-DD-TD (Mr. Jackson)
Technology Transfer Office
Ft. Monmouth, NJ 07703-5201

TITLE: Enhanced Wireless LAN (WLAN) Technology for Mobile Applications

OBJECTIVE: Increase throughput rate performance of Wireless LAN devices to become more competitive with current 100 Mbps wired Ethernet LANs; this will allow WLAN to effectively handle high capacity data, and high quality multimedia voice and video streams. Maintaining present area coverage for indoors and line-of-sight (LOS) outdoors achievable with the current 2 Mbps 802.11 WLANs at these increased data rates is also another top priority; objective distances are several hundred meters up to 1 km. At these increased data rates, multipath performance and resistance to EMI must be maintained for maximum range and throughput. For maximum compatibility with both commercial and tactical applications, the WLAN devices must be configurable for both military and commercial applications especially in the area of security, where for military use, these devices must be compatible with both COMSEC (external or embedded implementations) and TRANSEC. This family of devices should be comprised of an Access Point/Transceiver, PC Card for insertion into a mobile computer device, and a WLAN external adapter which allows direct connection to a workstation Ethernet port.

DESCRIPTION: The development and availability of high capacity WLAN technology will benefit both the military and commercial sectors by providing fast Ethernet connectivity for mobile and ad-hoc networks and minimize costs for installation of fast Ethernet where wired networks are inappropriate for existing infrastructures. Key technologies emphasized are high speed spread spectrum waveform with excellent multipath and EMI resistant performance, embedded multihop routing (between Access Point/Transceivers), and technologies for reduced size, weight, and power consumption.

ESTIMATED MAXIMUM FEDERAL FUNDING CONTRIBUTION \$0.8 M

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SUBMIT PROPOSALS TO:

U.S. Army Communications and Electronics Command

ATTN: AMSEL-RD-DD-TD (Mr. Jackson)

Technology Transfer Office

Ft. Monmouth, NJ 07703-5201

Medical Technologies

TITLE : LIGHTWEIGHT CHEMICAL/BIOLOGICAL (CB) PROTECTIVE CLOTHING BASED ON NOVEL MEMBRANES

OBJECTIVE: To optimize and demonstrate a series of perm-selective membranes for both military and civilian clothing applications. These membranes would selectively allow water vapor to permeate its structure, but not toxic chemical vapors and dangerous microorganisms, as they could be disseminated as CB threats in liquid, vapor, and aerosol forms.

DESCRIPTION: Presently, activated carbon-based fabric systems such as the Battle Dress Overgarment and the US Marine Corps Saratoga suit can effectively stop the agent vapors, but at a cost of bulk, heat stress, and weight. Furthermore, in order to protect the soldier against aerosol and liquid threats, additional use of a semipermeable membrane is required which would further increase heat stress, logistic burden, and cost.

The US Army Soldier Systems Command, Natick RD&E Center (Natick) is currently developing novel selectively permeable materials with the membrane and fabric industry. So far, laboratory testing including live agent tests, identified two membrane/fabric systems that have favorable physical properties and permeation characteristics that are suitable for clothing applications. Limited field tests of one fabric system also indicated an over-whelming preference of a selectively permeable fabric system over the US Army chemical protective carbon-based permeable fabric systems.

Primary work under this proposal will be to select one of these two perm-selective membranes, which have the best balanced material properties between protection and evaporative cooling potentials, then optimize this fabric system for further evaluations specific to the civilian protective clothing industry. These include tests that would normally be conducted for development of protective clothing for workers handling industrial chemicals, agricultural chemicals (pesticide/insecticide such as Organophosphates), blood-borne pathogens such as AIDS and Hepatitis B, other virus and bacteria contaminated environments, and for clean-room/electronic personnel. Testing that is specific to military applications will continue. This will include live agent testing, barrier and physical properties testing, and proving the efficacy of these systems for protecting the soldiers in environments that are contaminated with toxic chemicals and dangerous microorganisms.

ESTIMATED MAXIMUM GOVERNMENT FUNDING CONTRIBUTION: \$1.1M

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SUBMIT PROPOSALS TO:

Dr. Quoc Truong

US Army Soldier and Biological Chemical Command

US Army Soldier Systems Center
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TITLE: PRODUCTION FEASIBILITY OF FLAME RETARDANT TECHNOLOGIES FOR NYLON FIBER

OBJECTIVE: Demonstrate production feasibility of novel flame retardant technologies for nylon fibers. The development of a non-melting flame retardant nylon fiber will benefit both the military and the commercial sector by providing flame retardancy protection to nylon items that currently do not offer such protection and also by replacing very expensive fibers such as Nomex, Kevlar and PBI, used on tankers, aviators and fire fighter's clothing. In addition, the development of a highly flame retardant nylon fiber will also address the commercial sector needs in the areas of airplane seats and curtains, hospital and hotel curtains and bed linens, children's sleep wear, fire fighters, car racers, just to mention a few.

DESCRIPTION: Advanced flame retardant materials and innovative flame retardant formulations are currently being developed that will be co-extruded with the nylon polymer to produce a non-melting, char forming, highly flame retardant nylon fiber. Nylon fiber is the most widely used fiber in military items. One of the drawbacks of nylon is its burning characteristics. In addition to propagating flame, nylon melts during the burning process causing very deep and severe burns. The essence of this proposal is to form a partnership with industry to scale-up and demonstrate production capability of the current work being conducted under an exploratory development project entitled "Novel Flame Retardant Technologies for Cotton and Cotton/Synthetic Blends." This work is being done at both laboratory bench level and pilot scale. To insure proper transition of the technology to commercialization, a need exists to demonstrate fiber production feasibility.

ESTIMATED MAXIMUM GOVERNMENT FUNDING CONTRIBUTION: \$500K

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SUBMIT PROPOSALS TO:

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US Army Soldier and Biological Chemical Command
US Army Soldier Systems Center
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Natick, MA 01760

TITLE: DIAGNOSTICS, PROPHYLACTICS AND THERAPEUTICS FOR USE WITH MILITARILY RELEVANT DISEASES CAUSED BY POTENTIAL BIOLOGICAL WARFARE (BW) AGENTS.

OBJECTIVE: Develop diagnostic tests to identify potential BW agents under presumed battlefield conditions of limited time, electrical power, supplies and personnel. Develop vaccines and/or drugs for the prevention of diseases that are caused by BW agents. Deployed US military forces face the threat of exposure to BW attack. Reducing the impact of the exposure on unit readiness and performance is a high priority for US military services. Priority research issues include rapid and battlefield-forward agent identification; development of novel pharmaceuticals and immunogens; efforts to sequence genomes of agents of interest and correlate with agent's metabolism and/or immunogenesis; novel methods of vaccine, antitoxin and pharmaceutical production; and novel methods of delivery and administration. All products developed within the program are compliant with existing guidelines and requirements of the US Food and Drug Administration and are licensed accordingly. Current diseases of interest include anthrax, ricin intoxication, *Staph. aureus* enterotoxin exposure, brucellosis, plague, viral encephalitides, glanders, and others.

DESCRIPTION: The development, testing and deployment of advanced diagnostic devices and advanced, licensed vaccines or pharmaceuticals to mitigate the impact of pathogenic agent exposure on force readiness and performance will benefit the military sector by enhancing personal wellness of military service members. The commercial sector will experience enhanced civilian health care through the use of these advanced products both in the clinic/hospital setting and in the area of domestic preparedness for possible terrorist attacks. Key areas emphasized are: (1) Rapid and simple diagnostic systems for multiple agents, (2) Advanced vaccines for one or more BW agents, and (3) Advanced treatment to mitigate effects of agent exposure. Successful proposals in this topic area will develop diagnostic systems, vaccines or treatments that substantially enhance individual protection from BW agents and/or demonstrate significant advancement in ease of administration.

ESTIMATED MAXIMUM FEDERAL FUNDING CONTRIBUTION: \$2.7M

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Submit Proposals to:

U.S. Army Medical Research Acquisition Activity

Attn: MCMR-AAZ

820 Chandler St.

Fort Detrick, MD 21702-5014

TITLE: RAPID TESTS FOR TRANSFUSION TRANSMITTED DISEASE

OBJECTIVE: Develop tests in a field-useable format for the rapid detection of transfusion-transmitted diseases in human blood. The purpose of such tests is to improve the safety of blood collected in emergencies in areas remote from conventional testing laboratories or where the time and personnel requirements of conventional testing are limiting. Military uses include preparing blood in the field for emergency surgery by special operations forces and forward surgical teams and preparing platelets in combat support hospitals. Civilian uses include rapid release of fresh platelets and granulocytes from blood donor centers.

DESCRIPTION: The development and availability of FDA approved rapid tests for transfusion-transmitted infectious diseases would allow earlier release of blood products from blood donor centers than is possible with conventional centralized laboratory testing. The diseases of interest are HIV 1 & 2, HTLV 1 & 2, hepatitis B, hepatitis C, and syphilis and the tests should include HIV p24 and HbcAb testing. Tests must have the sensitivity and specificity of current screening tests and a common format that allows for rapid use in austere circumstances.

ESTIMATED MAXIMUM FEDERAL FUNDING CONTRIBUTION: \$75K

GOVT TPOC: Colonel John Hess, Walter Reed Army Institute of Research

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Submit Proposals to:

U.S. Army Medical Research Acquisition Activity

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820 Chandler St.

Fort Detrick, MD 21702-5014

TITLE: DETECTION, PRE-TREATMENTS AND THERAPEUTICS FOR USE WITH MILITARILY RELEVANT INJURIES CAUSED BY POTENTIAL CHEMICAL WARFARE (CW) AGENTS.

OBJECTIVE: Develop detection systems to identify potential CW agents under presumed battlefield conditions of limited time, electrical power, supplies and personnel. Develop pre-treatments and/or drugs for the prevention of injuries that are caused by CW agents. Deployed US military forces face the threat of exposure to CW attack. Reducing the impact of the exposure on unit readiness and performance is a high priority for US military services. Priority research issues include rapid and battlefield-forward agent identification; development of novel therapeutics for use before or after exposure; novel methods of pharmaceutical production; and novel methods of delivery and administration. All products developed within the program are compliant with existing guidelines and requirements of the US Food and Drug Administration and are licensed accordingly. Current CW agents of interest include nerve agents, vesicant agents, pulmonary agents, blood agents and others.

DESCRIPTION: The development, testing and deployment of advanced detection devices and advanced, licensed pharmaceuticals to mitigate the impact of CW agent exposure on force readiness and performance will benefit the military sector by enhancing personal wellness of military service members. The commercial sector will experience enhanced civilian health care through the use of these advanced products both in the clinic/hospital setting and in the area of domestic preparedness for possible terrorist attacks. Key areas emphasized are: (1) Rapid and simple detection systems for multiple agents, (2) Advanced pharmaceuticals for one or more CW agents, and (3) Advanced pre- or post-treatment to mitigate effects of agent exposure. Successful proposals in this topic area will develop detection systems or treatments that substantially enhance individual protection from CW agents and/or demonstrate significant advancement in ease of administration.

ESTIMATED MAXIMUM FEDERAL FUNDING CONTRIBUTION: \$2M

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U.S. Army Medical Research Acquisition Activity

Attn: MCMR-AAZ

820 Chandler St.

Fort Detrick, MD 21702-5014

TITLE: VACCINES AND DRUGS TO PREVENT MILITARILY RELEVANT INFECTIOUS DISEASES OF ENDEMIC ORIGIN.

OBJECTIVE: Develop vaccines and/or drugs for the prevention of militarily relevant infectious diseases which afflict morbidity and mortality upon deployed US military forces when deployed in regions with endemic infectious disease threats. Reducing the impact of endemic infectious diseases, both emerging diseases and historically relevant diseases, on unit readiness and performance is a high priority for all US military services. Priority research issues include development of novel pharmaceuticals and immunogens, efforts to sequence genomes of pathogens of interest, novel methods of vaccine and pharmaceutical production, and novel methods of delivery and administration. All products developed within the program are compliant with existing guidelines and requirements of the US Food and Drug Administration and are licensed accordingly. Current diseases of interest include malaria, enteric bacterial diseases (enterotoxigenic E. coli [ETEC], shigella and campylobacter), dengue, hantavirus, hemorrhagic fevers, leishmania, hepatitis, Group B meningococcal disease, rickettsial diseases, and HIV.

DESCRIPTION: The development, testing and deployment of advanced, licensed vaccines or pharmaceuticals to mitigate the impact of endemic infectious diseases on force readiness and performance will benefit both the military and the commercial sectors by enhancing personal wellness of military service members and civilian travelers, thereby optimizing readiness and performance. Key technologies emphasized are: (1) genetic sequencing of relevant pathogens and correlation with organism metabolism or organism immunogenesis and (2) combinatorial chemistry for discovery of pharmaceutical agents. Successful proposals in this topic area will develop vaccines or pharmaceuticals which substantially enhance individual protection from endemic infectious disease and which demonstrate significant advancement in ease of administration.

ESTIMATED MAXIMUM FEDERAL FUNDING CONTRIBUTION: \$4M

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TITLE: TELEMEDICINE AND ADVANCED MEDICAL TECHNOLOGIES

OBJECTIVE: Identify, explore, and demonstrate key technologies and enabling biomedical principles that are required to overcome technological barriers that are both medically and militarily unique. The goals of the telemedicine program are to provide technologies needed to incorporate health awareness into battlespace awareness, provide force protection, reduce time to critical intervention for injured personnel, improve the skills and efficiency of medical personnel, and improve the quality of emergency medical and surgical care throughout the battlespace while decreasing the far-forward footprint. Key objectives of the telemedicine program are to demonstrate capabilities for: real-time monitoring and assessment of the health status of warfighters and warfighting units; remote identification and assessment of injured personnel; reporting of individual/unit status to medical and operational personnel; realistic simulations for training of medical personnel; and decision support and remote intervention for medical personnel. Technologies developed within this area of interest have a strong potential commercial appeal in that they exploit key telecommunications and information technologies that are critical enablers of electronic healthcare delivery (e.g. emergency medicine, home health care, and inpatient monitoring).

DESCRIPTION: Development and employment of telemedicine and advanced medical technologies will enhance three broad (medical) operational capability areas – Joint Medical Readiness, Battlespace Medical Awareness, Effective Employment of Medical Forces - that are essential to the MHSS and its ability to support the future joint warfighter. These operational capability areas are comprised of more specific operational capability elements, including individual/unit medical skills proficiency, information superiority for medical applications, medical information acquisition, medical data fusion and distribution, medical situational interfaces, evacuation and treatment, and medical force management. Enhancements in these operational capability elements and broader operational capability areas will help ensure protection and sustainment of our most important and vulnerable assets- individual soldiers.

ESTIMATED MAXIMUM FEDERAL FUNDING CONTRIBUTION: \$225K

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Submit Proposals to:

U.S. Army Medical Research Acquisition Activity

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820 Chandler St.

Fort Detrick, MD 21702-5014

TITLE: ADVANCED NONTHERMAL RATION PROCESSING TECHNOLOGIES

OBJECTIVE: To validate and optimize advanced nonthermal processing technologies that will ensure the safety and nutritional value of fresh and freshlike preserved foods for consumption by warfighters in combat scenarios. Research and development will be done in conjunction with industrial partners to insure a production base to meet the flexibility in military logistics demanded by the 21st Century battlespace. The new pasteurization technologies will offer advantages to industry to meet consumer and commercial food service demands for convenient and easy-to-serve foods that are also high in nutritional value and safe from microbiological hazards.

DESCRIPTION: This program is designed to overcome barriers to commercialization of novel nonthermal pasteurization technologies including pulsed electric field (PEF) and high pressure preservation (HPP). Both methods offer high potential for microbiological control while minimizing the chemical and physical changes in foods brought about by classic thermal preservation methods. A concerted effort to meet regulatory concerns will be coordinated with the Food & Drug Administration's National Center for Food Safety and Technology. Consortia of government, academia and industrial members will be established to optimize high pressure and pulsed electric field technologies to include combination preservation strategies to produce shelf-stable ration items for the military and extended shelflife refrigerated items for both military and civilian food service. Process validation and optimization will involve collection and analysis of data on process effects on pathogenic microorganisms, content of labile nutrients of special interest to the military and nutraceutical foods industry, and consumer acceptance with attention also to process economics, engineering and scale-up issues. The DoD has been recognized to play a lead role in implementation of advanced food processing technologies in the intergovernmental response to the President's Food Safety Initiative.

ESTIMATED MAXIMUM GOVERNMENT FUNDING CONTRIBUTION:
\$1M (PEF) \$1M (HPP)

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SUBMIT PROPOSALS TO:
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TITLE: ADVANCED THERMAL PROCESSING METHODS

OBJECTIVE: Explore and validate, in collaboration with the food industry and academia, advanced thermal processing methods that would provide high quality foods with utmost convenience for consumption. By taking advantage of a high-temperature short-time process, sensory and nutritional attributes of freshly prepared foods can be retained and the product rendered shelf stable for a reasonable period. Using aseptic- or pre-packaged methods, the products are packaged in environmentally friendly and lightweight polymeric containers that are easy to open and logistically smart for storage. A combination of several such methods can further increase the throughput of the products and reduce the processing cost, and most important, produce foods with the highest quality.

DESCRIPTION: For years, US Army Natick Research and Development Center (NRDEC) has exploited numerous innovative thermal processing methods by validating the commercial sterility of the products with both microbiological and chemical methods, demonstrating the sensory quality with both consumer and technical panelists, and joining the market potential study with industrial and academic consortia. NRDEC also acted as a facilitator in assisting industry to acquire regulatory approval of the novel processing methods. Two key methods are ohmic heating and microwave sterilization. In contrast to the conventional low-temperature long-time retort processing, ohmic heating simultaneously heats fluid and particulates in pumpable foods, whereas microwave heating heats whole muscle foods from core to the surface. Both methods provide far less heat damage to the food products due to relatively short processing time. These methods can produce new varieties of entree items that are difficult to produce by the conventional methods. At this moment, the demand for such shelf stable, high quality foods is more in the military than in the civilian market due to unique military ration storage requirements. It is critical for DoD to take the lead in encouraging and facilitating industrial efforts to acquire regulatory approval of such methods.

ESTIMATED MAXIMUM GOVERNMENT FUNDINGCONTRIBUTION: \$2.4M

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